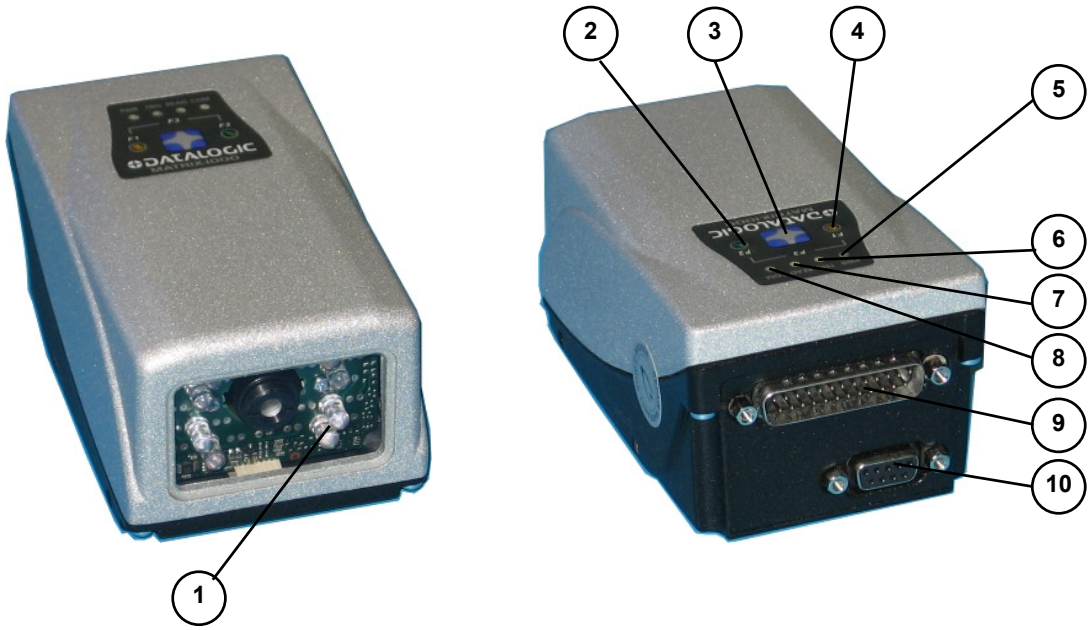
Matrix-1000™

QUICK REFERENCE GUIDE



Matrix-1000™ – GENERAL VIEW

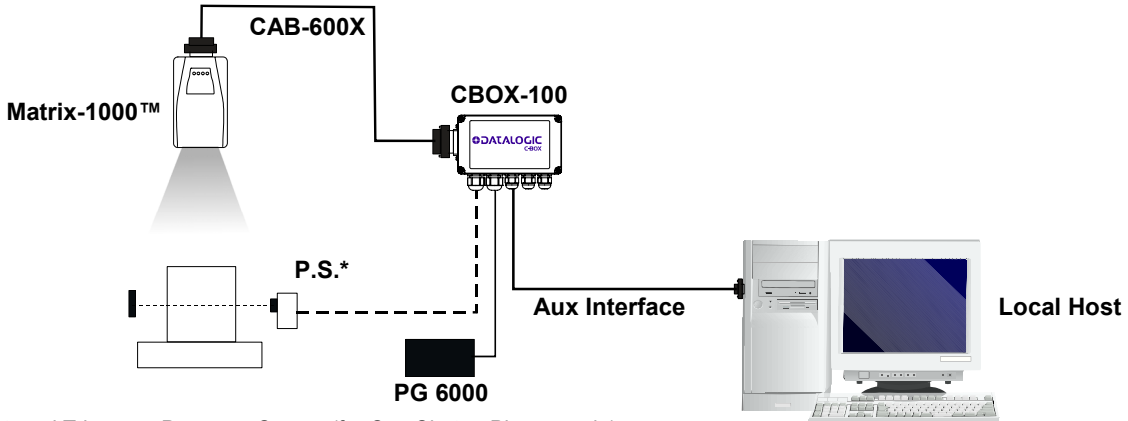
1. Reading Window
2. F2 LED
3. Keypad button
4. F1 LED
5. Power On LED
6. External Trigger LED
7. Good Read LED
8. Communication LED
9. Main/Auxiliary Interface
10. Auxiliary Interface

NOTE

This manual illustrates a Stand Alone application. For Multiplexer Layouts and for a complete reader configuration using VisiSet™ configuration program, refer to the Matrix-1000™ Reference Manual available on the CD. This manual is also downloadable from the Web at **www.automation.datalogic.com/matrix1000**.

STEP 1 – CONNECT THE SYSTEM

To connect the system in a Stand Alone configuration, you need the hardware indicated in Figure 1. In this layout the data is transmitted to the Host on the RS232 auxiliary serial interface which is also used for reader configuration by running VisiSet™.
When One Shot or Phase Mode Operating mode is used, the reader is activated by an External Trigger (photoelectric sensor) when the object enters its reading zone.



* External Trigger or Presence Sensor (for One Shot or Phase mode)

Figure 1 – Matrix-1000™ in Stand Alone Layout

C-BOX 100 Pinout for Matrix-1000™

The table below gives the pinout of the C-BOX 100 terminal block connectors. Use this pinout when the Matrix-1000™ reader is connected by means of the C-BOX 100:

C-BOX 100 Terminal Block Connectors			
Power		**Outputs**	
1, 3, 5	VS	21, 22	NC
2, 4, 6	GND	23, 24	NC
7, 8	EARTH GROUND	25	OUT 3+
20, 40	Reserved	26	OUT 3-
Inputs		**Auxiliary Interface RS232**	
27	EXT TRIG A (polarity insensitive)	35	TX AUX
28	EXT TRIG B (polarity insensitive)	37	RX AUX
29, 30	NC	38,39	GND
31, 33	NC	**Main Interface RS485 Half Duplex**	
32, 34	NC	11, 15	RTX 485+
36	NC	12, 16	RTX 485-
		17	NC
		18	NC
		10, 14, 19	SGND
		9, 13	RS485 Cable Shield

CAUTION

Do not connect GND and SGND to different (external) ground references. GND and SGND are internally connected through filtering circuitry which can be permanently damaged if subjected to voltage drops over 0.8 Vdc.

CAUTION

When connected to a C-BOX 3x0/4x0, Matrix-1000™ can only communicate through its Auxiliary Interface. The Matrix-1000™ 9-pin Auxiliary port connector cannot be used for communication (i.e. configuration through VisiSet™). To configure Matrix-1000™ through the 9-pin connector inside the C-BOX 3x0/4x0, the C-BOX 3x0/4x0 must first be configured. See the relative C-BOX Installation Manual for details.

STEP 2 – MOUNTING AND POSITIONING THE SYSTEM

1. To mount the Matrix-1000™, use the mounting bracket to obtain the most suitable position for the reader as shown in the figures below.

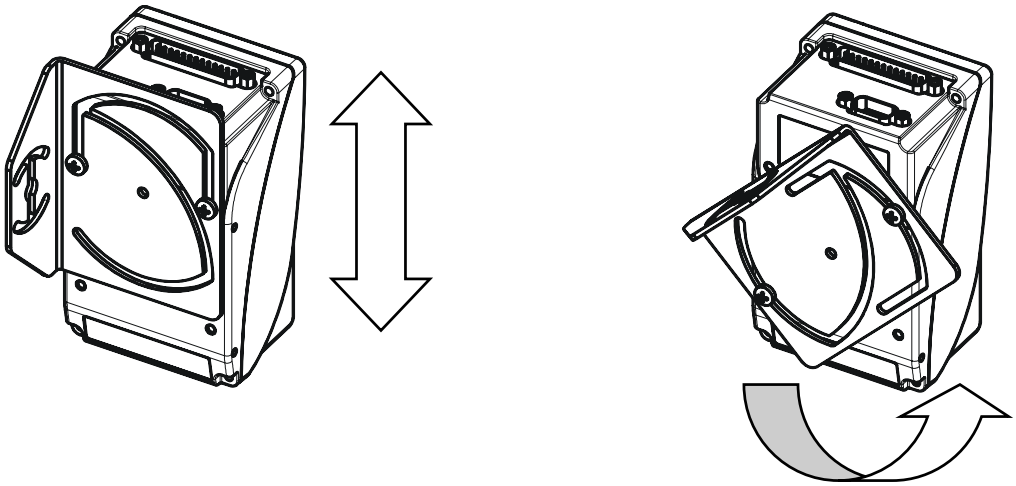
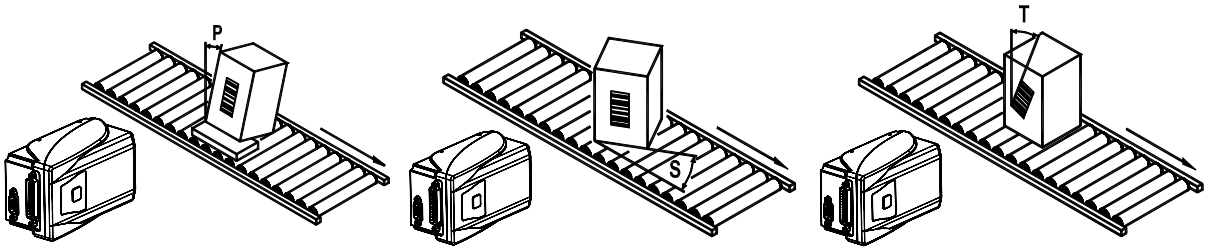


Figure 2 - Positioning with Mounting Bracket

2. When mounting the Matrix-1000™ take into consideration these three ideal label position angles: **Pitch or Skew 10° to 20°** and **Tilt 0°**, although the reader can read a code at any Tilt angle.



Minimize **Assure at least 10°** **Minimize**

Figure 3 – Pitch, Skew and Tilt Angles

3. Refer to the Reading Features in the Appendix of this Quick Reference Guide to determine the distance your reader should be positioned at.

STEP 3 – AUTO-LEARNING CONFIGURATION

An autolearning procedure is available to reduce installation time.

Status and diagnostic information are clearly presented by means of four colored LEDs, whereas the single push button and F1 and F2 LEDs give immediate access to the following relevant functions:

- *Positioning (F1)* gives visual feedback from the F1 LED to help center the code in the reader's FOV without external tools or software programs
- *Auto Learn (F2)* to self-detect and auto-configure calibration and code setting parameters
- *Restore Default (F3) to return to factory default settings*

The colors and meaning of the four status LEDs are illustrated in the following table:

PWR (red)	This LED indicates the device is powered
TRIG (yellow)	This LED indicates the external trigger activity
READ (red)	This LED confirms successful reading. It is also used to signal successful startup. At power on this LED turns on and after a few seconds turns off. If the startup is not successful, this LED remains on.
COM (green)	This LED indicates active communication on the main serial port.

AUTO LEARN

If you are configuring your reader using the *Auto Learn* procedure:

1. Place the desired code in front of the reader at the correct reading distance (depending on the model, see the Reading Features table in the Appendix of this Quick Reference Guide).
2. Enter the *Auto Learn* function *(F2)* by pressing and holding the push button until only the F2 LED is on.
3. Release the button to enter the *Auto Learn* function.
   Once entered, the reader acquires an image and automatically configures the optimal exposure and gain parameters as well as detecting and recognizing the code, which is presented to it. The F2 LED blinks during this process.
4. At the end of the procedure, the new configuration parameters will be stored to permanent memory, the F2 LED remains on continuously and then the function automatically exits, the F2 LED turns off.

If the Auto Learn calibration cannot be reached within a short timeout (max. 1 minute), Matrix-1000™ will exit without saving the configuration parameters, the F2 LED will not remain on continuously but it will just stop blinking.

To cancel the Auto Learn function without saving the configuration parameters, press and hold the keypad button at any time during the procedure: the F2 LED will stop blinking.

Auto Learn (F2)
green

Figure 4 – Auto Learn Function

Repeat the procedure if needed, to program different code symbologies, however you must present only one code at a time to the reader.

Matrix-1000™ is able to decode any code symbology in its library with this procedure.

NOTE

If your application has been configured using Auto Learn, your reader is ready. If necessary you can use VisiSet™ for advanced reader configuration.

POSITIONING (OPTIONAL)

At the end of the *Auto Learn* procedure, you can use the *Positioning* procedure to center the code with respect to the reader's FOV.

1. While the desired code is in front of the reader at the correct reading distance, enter the *Positioning* function *(F1)* by pressing and holding the push button until only the F1 LED is on.
2. Release the button to enter the Positioning function.
   Once entered, the reader continuously acquires images and gives visual feedback using the F1 LED to indicate when the code is centered with respect to the reader's FOV. Slow blinking means that the positioning value must be improved.
3. To obtain the best value in terms of positioning, move the code and/or the reader so as to position the code as close as possible to the center of the Field of View, keeping the correct focus distance. Check F1 LED blinking: the best code positioning corresponds to fast (almost continuous) blinking.
4. After a short timeout the function automatically exits, the F1 LED remains on continuously and then stops blinking.

If no valid code is present in the FOV, after about 3 minutes, Matrix-1000™ will automatically exit, the F1 LED will not remain on continuously but it will just stop blinking.

To cancel the Positioning function, press and hold the keypad button at any time during the procedure: the F1 LED will stop blinking.

Figure 5 – Positioning Function

RESTORE DEFAULT (OPTIONAL)

At any time you can use the *Restore Default* procedure to return the reader to the factory default settings.

1. Enter the *Restore Default* function *(F3)* by pressing and holding the push button until both the F1 and F2 LEDs are on.
2. Release the button to perform the *Restore Default* function.

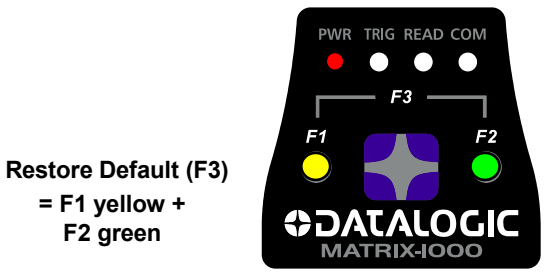


Figure 6 – Restore Default Function

STEP 4 – INSTALLING VISISET™ CONFIGURATION PROGRAM

VisiSet™ is a Datalogic reader configuration tool providing several important advantages:

- Autolearning Wizard for new users;
- Defined configuration directly stored in the reader;
- Communication protocol independent from the physical interface allowing to consider the reader as a remote object to be configured and monitored.

To install VisiSet™, turn on the PC that will be used for the configuration, running Windows 98, 2000/NT or XP, then insert the VisiSet™ CD-ROM, wait for the CD to autorun and follow the installation procedure.

This configuration procedure assumes a laptop computer, running VisiSet™, is connected to the reader's auxiliary port.

WIZARD FOR QUICK READER SETUP

After installing and running the VisiSet™ software program the following window:

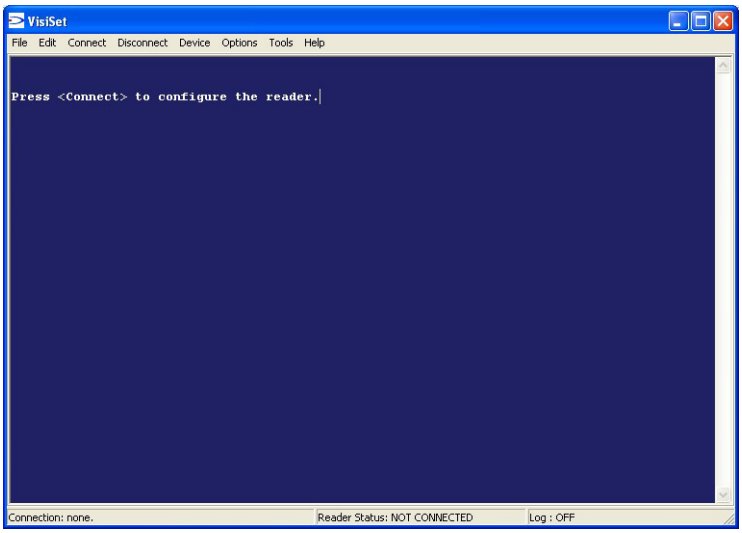


Figure 7 - VisiSet™ Opening Window

Set the communication parameters from the "Options" menu. Then select "Connect", the following window appears:

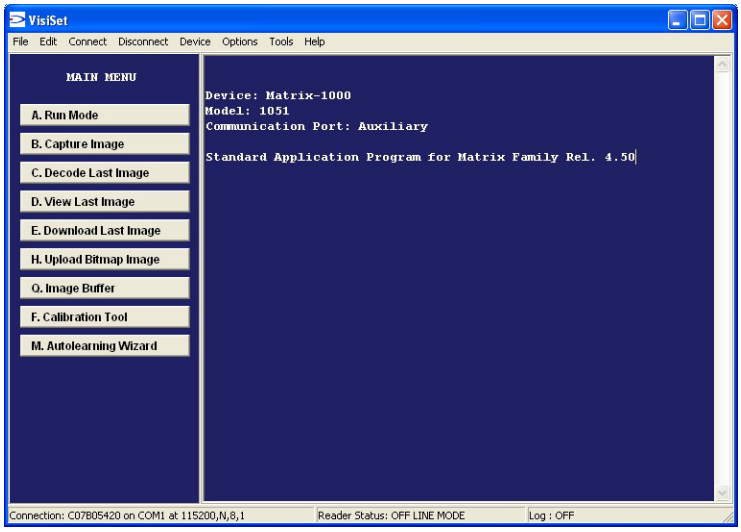
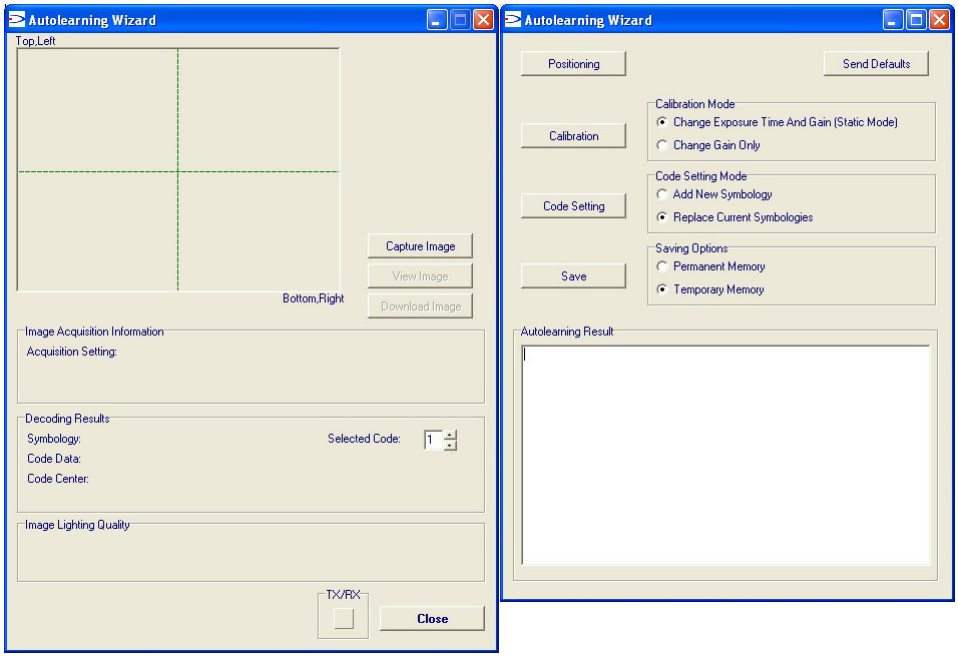


Figure 8 - VisiSet™ Main Window After Connection

The Autolearning Wizard option is advised for rapid configuration or for new users. It allows reader configuration in a few easy steps.

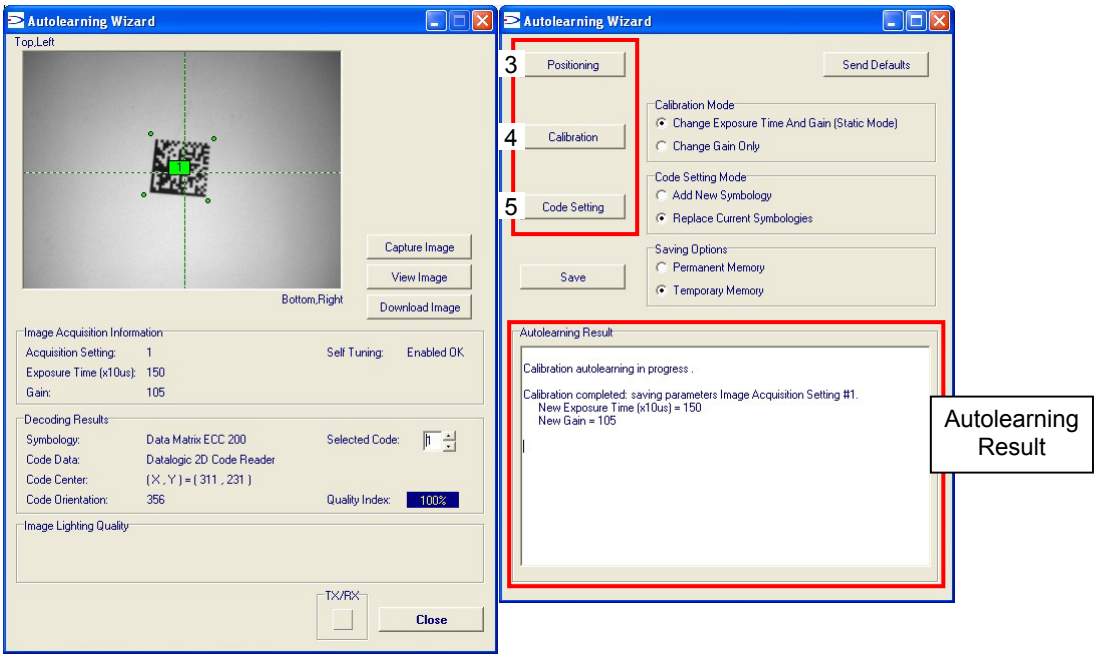
1. Select the Autolearning Wizard button from the Main menu.



2. Place the desired code in front of the reader at the correct reading distance (depending on the model, see the Reading Features table in the Appendix of this Quick Reference Guide).

3. Press the "Positioning" button. The reader continuously acquires images and gives visual feedback in the view image window to indicate when the code is centered with respect to the reader's FOV. Move the reader (or code) to center it. Press the Positioning button again to stop positioning.

4. Select a Calibration Mode choice and press the "Calibrate" button.

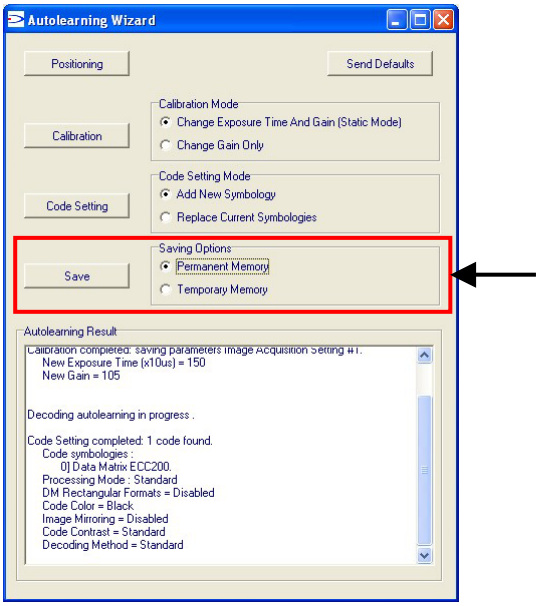


The reader flashes once acquiring the image and auto determines the best exposure and gain settings. If the code symbology is enabled by default, the code will also be decoded.

5. If the code symbology is not enabled by default, select a Code Setting Mode choice and press the "Code Setting" button.

The Autolearning Result section of the Autolearning Wizard window shows the parameter settings and the code type results.

6. Select a Saving Options choice and press the "Save" button.



7. Close the AutoLearning Wizard.

NOTE

If your application has been configured using the VisiSet™ Autolearning Wizard, your reader is ready. If necessary you can use VisiSet™ for advanced reader configuration.

ADVANCED READER CONFIGURATION

For further details on advanced product configuration, refer to the complete Reference Manual on the installation CD-ROM or downloadable from the web site through this link: **www.automation.datalogic.com/matrix1000**.

The following are alternative or advanced reader configuration methods:

ADVANCED CONFIGURATION USING VISISET™

Advanced configuration can be performed through the VisiSet™ program by selecting *Device> Get Configuration From Temporary Memory* to open the Parameter Setup window in off-line mode. Advanced configuration is addressed to expert users being able to complete a detailed reader configuration. The desired parameters can be defined in the various folders of the Parameter Setup window and then sent to the reader memory (either Temporary or Permanent):

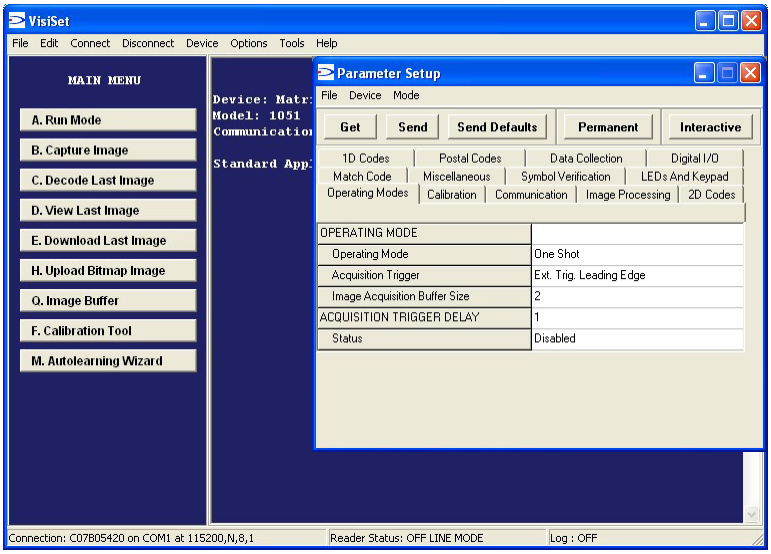


Figure 9 - VisiSet™ Parameter Setup Window

HOST MODE PROGRAMMING

The reader can also be configured from a host computer using the Host Mode programming procedure, by commands via the serial interface. See the Host Mode Programming file on the CD-ROM.

ALTERNATIVE LAYOUTS

If you need to install a Multiplexer network refer to the **Matrix-1000™** Reference Manual.

APPENDIX

READING FEATURES

READING FEATURES							
Frame Rate	Up to 30 frames/sec. with VGA images						
Readable Codes per Frame	Up to 100						
Pitch	10° - 35°						
Tilt	0° - 360°						
MODELS	**Focus Distance mm (in)**	**Field of View [1] mm (in)**	**ppi [2]**	**Typ. Linear and Stacked Code Resolution mm (mils)**	**Typ. 2D Code Resolution mm (mils)**	**Reading Distance [3] mm (in)**	
						min.	**max.**
1021 HD	115 (4.53)	25 × 19 (0.98 × 0.75)	653	0.10 (4)	0.19 (7.5)	105 (4.13)	125 (4.92)
1031 SD	155 (6.10)	34 × 26 (1.34 × 1.02)	478	0.15 (6)	0.25 (10)	135 (5.31)	180 (7.08)
1041 LD	110 (4.33)	54 x 40 (2.13 × 1.57)	300	0.20 (8)	0.38 (15)	90 (3.45)	140 (5.51)
1051 MR	210 (8.26)	95 × 70 (3.74×2.75)	170	0.30 (12)	0.60 (24)	150 (5.90)	250 (9.84)

[1] @ Focus Distance

[2] Pixels per Inch @ Focus Distance

[3] Measurement Conditions:

- Test Chart: provided with the reader
- Still code at the center of the FOV
- Code Symbology: Data Matrix ECC 200
- Code Resolution: Typ. 2D Code Resolution
- Tilt Angle: 45°
- Skew Angle: 15°
- Image Processing Mode: Advanced Code Setting

Depending on the code resolution, symbology and number of characters in the code, the Reading Area can be different from the FOV.

TECHNICAL FEATURES

ELECTRICAL FEATURES	
Power	
Supply Voltage	10 to 30 Vdc
Power Consumption	4 W max.; 2.5 W typical
Communication Interfaces	
Main - RS485 half-duplex	2400 to 115200 bit/s
Auxiliary - RS232	2400 to 115200 bit/s
Input	
External Trigger	Opto-coupled and polarity insensitive
Outputs	
OUT3	Opto-coupled

OPTICAL FEATURES	
Image Sensor	Matrix CCD
Image Format	VGA (640x480)
Lighting System	LED array
Wavelength	630 ~ 670 nm
Max LED Output Power	0.7 mW to EN60825-1
LED Safety Class	Class 1 to EN60825-1

USER INTERFACE	
LED Indicators	PWR, TRIG, READ, COM, F1, F2
Keypad Button	Configurable via VisiSet™

SOFTWARE FEATURES

Readable Code Symbologies

1-D and stacked	2-D	POSTAL
• PDF417 Standard and Micro PDF417 • Code 128 (EAN 128) • Code 39 (Standard and Full ASCII) • Interleaved 2 of 5 • Codabar • Code 93 • Pharmacode • EAN-8/13 - UPC-A/E (including Addon 2 and Addon 5) • GS1 DataBar (RSS) Family • Composite Symbologies	• Data Matrix ECC 200 (Standard) • QR Code (Standard) • MAXICODE • Aztec Code • Microglyph (this symbology requires an activation procedure – contact your local Datalogic Automation distributor for details)	• Australia Post • Royal Mail 4 State Customer • Kix Code • Japan Post • PLANET • POSTNET, POSTNET (+BB) • POSTNET + PLANET, POSTNET (+BB) + PLANET

Operating Mode	ONE SHOT, CONTINUOUS, PHASE MODE
Configuration Mode	By means of VisiSet™ configuration software
Parameter Storage	Permanent memory (Flash)

SYMBOL VERIFICATION

Standard	Supported Symbologies
ISO/IEC 16022	Data Matrix ECC 200
ISO/IEC 18004	QR Code

MECHANICAL FEATURES	
Dimensions	121 x 73 x 57 mm (4.76 x 2.87 x 2.24 in.)
Weight	330 g. (11.6 oz.)
Material	Magnesium alloy

ENVIRONMENTAL FEATURES	
Operating Temperature	0 to 40 °C (32 to 104 °F)
Storage Temperature	-20 to 70 °C (-4 to 158 °F)
Max. Humidity	90% non condensing
Vibration Resistance IEC 68-2-6 test FC	14 mm @ 2 to 10 Hz; 1.5 mm @ 13 to 55 Hz 2 g @ 70 to 200 Hz; 2 hours on each axis
Shock Resistance IEC 68-2-27 test EA	30 g; 11 ms; 3 shocks on each axis
Protection Class	IP64 (sealed connectors required)

MECHANICAL DIMENSIONS

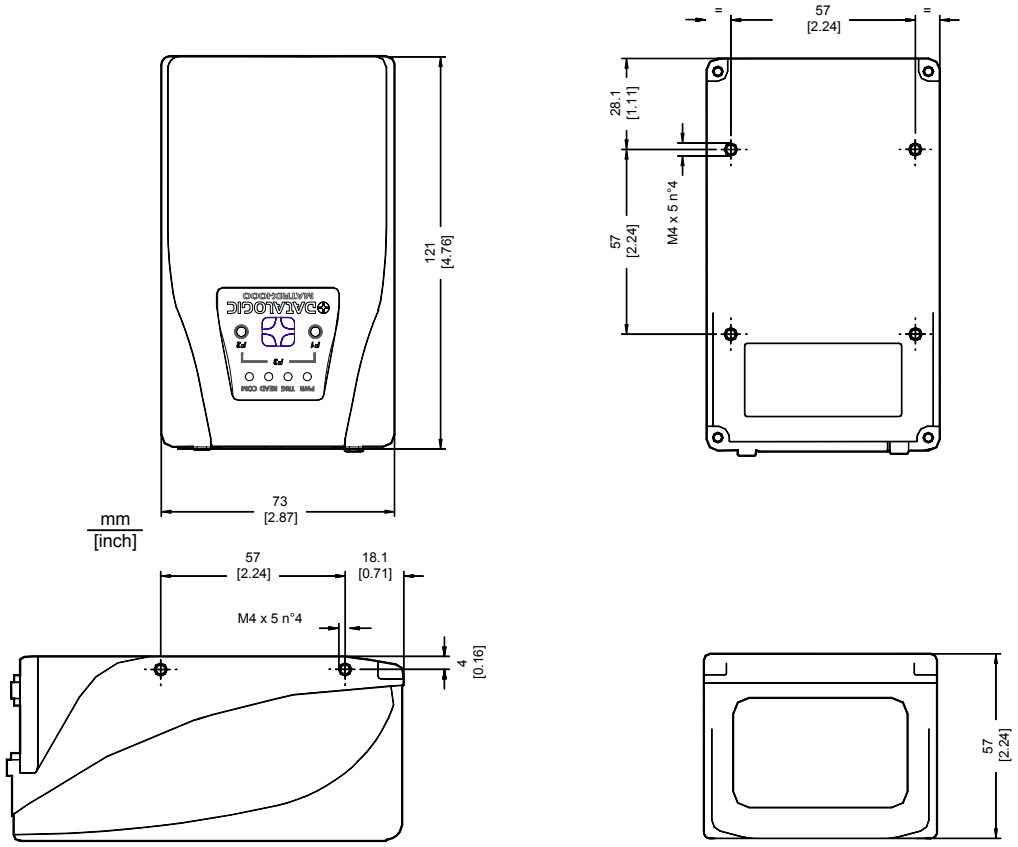


Figure 10 – Matrix-1000™ Overall Dimensions

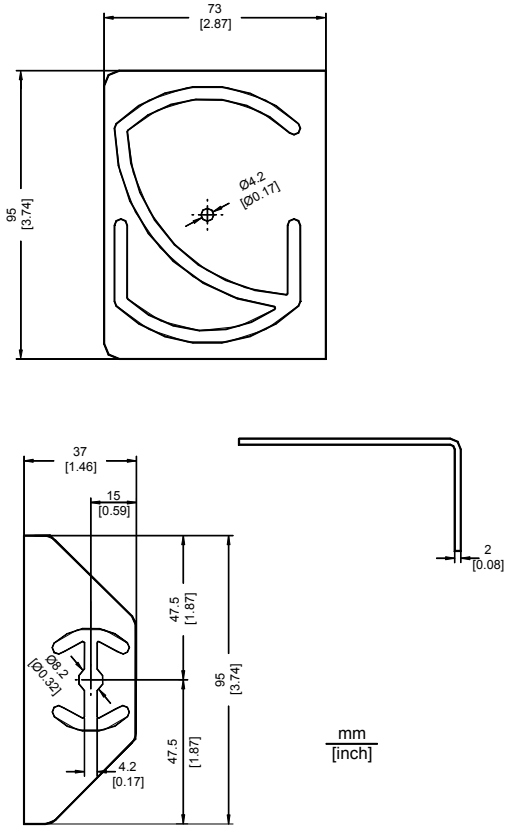


Figure 11 – Mounting Bracket Overall Dimensions

PATENTS

This product is covered by one or more of the following patents:

U.S. patent: 6,512,218 B1; 6,616,039 B1
European patent: 999,514 B1; 1,014,292 B1.

SERVICES AND SUPPORT

Datalogic provides several services as well as technical support through its website. Log on to **www.automation.datalogic.com** and click on the links indicated for further information including:

- **PRODUCTS**
  Search through the links to arrive at your product page where you can download specific **Manuals** and **Software & Utilities** including:
  - **VisiSet™** a utility program, which allows device configuration using a PC. It provides RS232 interface configuration.
- **SERVICES & SUPPORT**
  - **Datalogic Services -** Warranty Extensions and Maintenance Agreements
  - **Authorised Repair Centres**
- **CONTACT US**
  E-mail form and listing of Datalogic Subsidiaries

COMPLIANCE

EMC COMPLIANCE

In order to meet the EMC requirements:

- connect reader chassis to the plant earth ground by means of a flat copper braid shorter than 100 mm;
- connect the main interface cable shield to pin 1 of the reader 25-pin connector;
- use two clip-on ferrite sleeves (type Stewart 28A2029-0A0) on the main interface cable near the reader 25-pin connector;

POWER SUPPLY

This product is intended to be installed by Qualified Personnel only.

This product is intended to be connected to a UL Listed Computer which supplies power directly to the reader or a UL Listed Direct Plug-in Power Unit marked LPS or “Class 2”, rated 10 to 30 V, minimum 1 A.

CE COMPLIANCE

Warning: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

WEEE COMPLIANCE

DATALOGIC™ DECLARATION OF CONFORMITY CE 07

Datalogic Automation S.r.l.
Via S. Vitalino 13
40012 - Lippo di Calderara
Bologna - Italy

dichiara che
declares that the
déclare que le
bescheinigt, daß das Gerät
declare que el

Matrix-1XXX; e tutti i suoi modelli / and all its models / et tous ses modèles / und seine Modelle / y todos sus modelos

sono conformi alle Direttive del Consiglio Europeo sottoelencate:
are in conformity with the requirements of the European Council Directives listed below:
sont conformes aux spécifications des Directives de l'Union Européenne ci-dessous:
der nachstehend angeführten Direktiven des Europäischen Rats:
cumple con los requisitos de las Directivas del Consejo Europeo, según la lista siguiente:

89/336/EEC EMC Directive e/and/et/und/y **92/31/EEC, 93/68/EEC** emendamenti successivi / further amendments / ses successifs amendements / späteren Abänderungen / succesivas enmiendas

Basate sulle legislazioni degli Stati membri in relazione alla compatibilità elettromagnetica ed alla sicurezza dei prodotti.
On the approximation of the laws of Member States relating to electromagnetic compatibility and product safety.
Basée sur la législation des Etats membres relative à la compatibilité électromagnétique et à la sécurité des produits.
Über die Annäherung der Gesetze der Mitgliedsstaaten in bezug auf elektromagnetische Verträglichkeit und Produktsicherheit entsprechen.
Basado en la aproximación de las leyes de los Países Miembros respecto a la compatibilidad electromagnética y las Medidas de seguridad relativas al producto.

Questa dichiarazione è basata sulla conformità dei prodotti alle norme seguenti:
This declaration is based upon compliance of the products to the following standards:
Cette déclaration repose sur la conformité des produits aux normes suivantes:
Diese Erklärung basiert darauf, daß das Produkt den folgenden Normen entspricht:
Esta declaración se basa en el cumplimiento de los productos con las siguientes normas:

EN 55022 (Class A ITE), August 1994:
Amendment A1 (Class A ITE), October 2000:
LIMITS AND METHODS OF MEASUREMENTS OF RADIO DISTURBANCE CHARACTERISTICS OF INFORMATION TECHNOLOGY EQUIPMENT

EN 61000-6-2, October 2001:
ELECTROMAGNETIC COMPATIBILITY (EMC)
PART 6-2: GENERIC STANDARDS - IMMUNITY FOR INDUSTRIAL ENVIRONMENTS

Lippo di Calderara, April 2nd, 2007

Lorenzo Girotti
Product & Process Quality Manager